Treating Food Approval-Seeking Behavior: One Bite at a Time

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Abstract The prevalence of feeding problems in children with autism is high. The current investigation was a treatment of a unique presentation of food-related prompt dependence with a 6-year-old boy with autism who was reliant upon approval from adults for consumption of every bite of food. Instructions were used to establish independent eating, in which the number of bites specified in the instruction was systematically increased. Independent bites increased from a baseline level of 0.67% to a final phase level of almost 100%, and the instruction was faded to “eat your lunch”.

Keywords Autism · Feeding problems · Instructions · Rules

The prevalence of feeding problems in children with autism spectrum disorders (ASDs) is high (Volkert & Vaz, 2010). These problems may include food refusal, food selectivity based on food type and texture, and problem behavior during meals. Distinctions between food refusal and food selectivity include insufficient caloric intake versus the consumption of specific foods or liquids (e.g., texture, groups), but not others, respectively (Sharp et al., 2013). Antecedent strategies for addressing these feeding problems include altering the

consistency or texture of the foods presented (e.g., Mueller, Piazza, Patel, Kelley, & Pruett, 2004), presenting preferred and nonpreferred foods simultaneously (e.g., Ahearn, 2003), and applying gentle pressure at the chin as a prompt to chew food (with a flipped spoon presentation) (e.g., Dempsey, Piazza, Groff, & Kozisek, 2011) among others. Not only can the type and amount of food consumed be a concern, but the pace with which individuals eat has also been targeted. These latter feeding issues tend to be more a concern of self-pacing of food consumption, rather than insufficient intake due to refusal (Girolami, Kahng, Hilker, & Girolami, 2009).

Prompting has been successfully used both to decrease the rate with which food is consumed (e.g., Angelesea, Hoch, & Taylor, 2008) and to increase rate of consumption (e.g., Girolami et al., 2009). Although prompt dependence, in which an individual only responds correctly in the presence of a prompt, has been researched for decades (e.g., Oppenheimer, Saunders, & Spradlin, 1993), prompt dependence during meals has received little attention within the literature. The current investigation was a unique presentation of prompt dependence related to consumption of food, in which the child only consumed food if he received approval or prompts from an adult. Neither food type nor pace influenced how often he took a bite during meals. Systematic instructions were used to prompt eating and were eventually faded to establish independent eating.

Methods

Participant, Setting, and Materials

Hans, a 6-year-old boy with ASD, participated in the clinical study. Hans spoke with full sentences, manded for missing items, and followed multiple-step instructions. Hans self-fed

Utility to Practitioners

- Effective treatment of rigid behavior during meal times
- Establishing use of flexible rules for individuals with strict rule adherence
- Training indirect stimulus control (e.g., feelings of hunger or satiation) during meals
- Eliminating prompt dependence during meals

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food of all textures, did not have any medical or physical deficits that affected feeding, and weighed within the 90th percentile for his age. That is, he had no problems with food refusal or food selectivity and he ate a reasonable (e.g., age appropriate) diet. Hans exhibited strong preference for sameness and strictly adhered to rules provided by adults as well as his own self-rules. He often asked adults to provide rules for ongoing activities. Hans generally did not engage in problem behavior unless ongoing events seemed to violate a stated rule or expectation or when his request to confirm the accuracy of a rule was not honored. In these situations, Hans cried, yelled, and/or engaged in mild aggression (e.g., scratching, hitting other's hands).

Hans received center-based applied behavior analytic services 8 hours per day, two times per week to address communication and social skill deficits. When Hans began the services, he ate a variety of food, but only if an adult prompted every bite throughout the meal. The prompts took several forms including instructions (e.g., "Take a bite of your lunch"), gesturing to his plate, nodding, touching his hand, arm, or back, and pointing to a textual prompt (e.g., "Eat your lunch"). When prompts were not provided, Hans asked permission before taking a bite of food. If approval was not provided (e.g., "Okay"), Hans cried and repeated the request(s) at increased volumes. For every prompt, Hans took a single bite of food and waited for the next prompt or asked permission for the next bite. If he was told to take more than one bite of food, Hans took the first bite, scooped more food and placed his utensil on his plate, and then requested permission to take the next bite of food. Without these prompts or approval to eat, Hans sat in front of his plate for extended periods (e.g., 90 min) of time, without taking a bite of food.

Treatment sessions occurred in individual therapy rooms at a center-based program, and the sessions occurred during lunch each day. The rooms varied in size, but all contained children-sized tables and chairs. Only the therapist, Hans, and an independent data collector attended lunch sessions. Hans' parents allowed him to select three foods to bring to the center for lunch, which included one to two main dishes (e.g., chicken nuggets, macaroni and cheese), a vegetable (e.g., corn, green beans), and a side dish (e.g., grapes, cheese slices). Each type of food arrived to the center in 5 oz containers and was placed on a four-compartment plate. Lunch sessions typically did not exceed 20 min throughout the study.

Dependent Variable, Interobserver Agreement, and Procedural Integrity

The dependent variable was the percentage of bites of food taken independently during lunch at the center-based program. An independent bite of food was scored when no prompt or approval immediately preceded a bite of food. A prompted bite of food was scored if Hans took a bite of food

immediately after a prompt or approval. If Hans took two bites of food immediately after the prompt or approval, the first bite of food would be scored as prompted and the second bite would be scored as independent. The percentage of independent bites of food was calculated by dividing the number of bites taken, that did not immediately follow a prompt or rule, divided by the total number of bites during lunch, and multiplying by 100. An independent observer recorded the number of independent and prompted bites during 30% of lunch sessions. Interobserver Agreement (IOA) was calculated by using a total score approach and was calculated by dividing the lowest number of independent bites, by the highest, and multiplying by 100. IOA averaged 96% (range, 85% to 100%) across phases. Procedural integrity was evaluated in 30% of all lunch sessions and was calculated by dividing the number of steps implemented correctly by the total number of procedural steps, and multiplying by 100. Behavioral skills training was used to train the therapist for each phase of the study. The following steps were scored as appropriate for each phase: (1) providing prompts per phase requirement (e.g., bite requirements, self-monitoring), (2) providing praise when the criterion was met (i.e., B and B' phases), (3) re-presenting instructions when the criterion was not met (i.e., B and B' phases), and (4) presenting the meal-termination questions. Procedural integrity was 100%.

Experimental Design and Procedure

The percentage of independent bites was evaluated using a reversal design. The evaluation took place across eight phases (ABAB'CB'DB') with a final return to the most successful phase (B'). The (') notation is used for all subsequent B phases because the instructions in the intervention were gradually changed across phases; however, the primary independent variable remained the same throughout (i.e., instruction). At the beginning of every session, Hans accompanied the therapist to the center's kitchen, where the two prepared the plate of food. Hans chose where each food was placed on the divided plate, carried the warmed food back to the session room, and sat in front of the table, whereas the therapist was positioned next to the table.

Baseline (A)

The therapist emulated the behavior Hans' parents described occurring at their meal times at home. The therapist provided various prompts (e.g., vocal, pointing to plate) to eat approximately every 30 s to 2 min. This timing of prompts was variable rather than fixed to simulate prompts delivered at home. If Hans requested to take a bite of food, an approval statement or gesture was provided. When Hans requested to be finished with lunch, the therapist granted the request. The

therapist did not talk to Hans during lunch, other than to provide the prompts or approval to eat.

Multiple-Bite Instructions (MBIs) (B)

The therapist presented instructions to take multiple bites (e.g., “take [#] bites of macaroni and cheese”) of food item(s) throughout the session. The initial instruction was to take two bites because Hans always took only one bite when prompted in baseline. The number of bites specified in the instruction increased by one bite (range 1–10) each time the criterion was met. The criterion for increasing the number of bites was eating the specified number of bites for three consecutive trials (e.g., take two bites of food with no other prompts on three consecutive trials before moving to three bites). If Hans met the criterion during a single-lunch period, the next highest MBI was presented as long as Hans did not request for lunch to be terminated. Once Hans met the required bites for a given instruction, the therapist waited 5 s to allow independent bites, and then provided praise (e.g., “Good job taking all your bites of food”). The therapist waited until Hans finished chewing his food completely before providing the next MBI. If Hans did not meet the bite requirement and/or paused eating for more than 1 min, the therapist asked Hans how many bites he had taken and how many more bites he needed to take. This question was scored as a prompt; therefore, the bite immediately following this question was scored as prompted. As the number increased above eight, Hans requested a reminder or confirmation of the number of required bites in a few trials. When he did this, the number was restated (e.g., “10 bites”), but this was not counted as an additional prompt. If at any time during the session Hans requested to be finished with lunch, he was asked two questions “Are you full?” and “Is your tummy hungry.” As long as Hans responded “yes” and “no,” respectively, the lunch session was terminated. This procedure was included to facilitate discrimination between being hungry and satiated (i.e., a concern expressed by parents).

Lunch Rule + MBI (B')

The procedures in this phase were identical to the MBI phase (B) with the following exception. An initial instruction (i.e., “Eat your lunch”) was added prior to each MBI (i.e., “Eat your lunch. Take [#] bites of food”) with the eventual goal of the “eat your lunch” instruction evoking consumption of the entire meal. The initial MBI for this phase started with the highest number of bites for which Hans met the mastery criterion during the prior MBI phase (i.e., 10 bites). The number of bites was subsequently increased by one bite each time, up to 17.

No Instructions (C)

This probe allowed an evaluation of whether instructions and rules could be eliminated with sustained treatment effects. No prompts, approval for bites, or rules were presented. Any requests or questions directed toward the therapist to be able to take a bite of food were ignored, and no praise was provided during the lunch session. The termination procedure remained the same.

Meal Self-Management (D)

The purpose of this phase was to transfer food prompting from the therapist to Hans, by allowing Hans to select and monitor his own food consumption. Self-management was hypothesized to be more sustainable than prompting by others in the long term. At the beginning of each session, the “Eat your lunch” instruction was provided. The therapist then asked Hans “You get to pick what to want to eat. How many bites of lunch will you have?” For each self-instruction Hans identified (e.g., “First, 3 bites of corn, then 3 bites of mac and cheese.”), the therapist provided acknowledgement of the instruction (e.g., “Okay,” nodding) and provided praise when Hans met his self-identified criterion. If Hans did not select the next number of bites to take after meeting the previous criterion, the therapist waited 30 s to 1 min before asking him how many bites he wanted to take (i.e., a prompt). In the second session, self-monitoring of food consumption was added. Hans was taught to self-monitor via role-play using a toy monster-shaped box with an opening for small objects. For every item (e.g., colored blocks, jiggle bells) Hans placed in the monster’s mouth, he was prompted to mark a tally on a simplified datasheet. Training continued until Hans had 100% agreement with the therapist, who independently scored the number of items placed into the monster’s mouth. During sessions, prompts to monitor his bites followed the “eat your lunch” rule. Praise was provided for accurate self-monitoring. Hans was always accurate in self-monitoring. The same termination procedure was in effect.

Lunch Rule + MBI (B')

The procedures for this phase were identical to those described above, with one variation. One MBI was provided at the beginning instead of throughout the session (e.g., “Eat your lunch. Eat your chicken nuggets and your corn”). If Hans told or asked the therapist if he could eat specific foods, the therapist gave a confirmation statement (e.g., “Go for it,”) and did not provide any additional prompts. After presenting the plate, the therapist waited 5 s before presenting the instruction to allow independent consumption. Praise was provided after Hans met the requirement, and lunch was terminated based on the procedures described previously.

Results and Discussion

Table 1 includes both the total number of bites of food taken and the percentage of independent bites of food during lunch

sessions. Figure 1 illustrates the percentage of bites of food scored as independent across all phases. During baseline, Hans had near zero levels of independent bites of food. Hans' percentage of independent bites increased ($M = 67\%$) upon the

Table 1 Total number and percentage of independent bites of food during each phase

	Session	Number of bites of food	% independent bites of food
Baseline	1	*	0
	2	*	0
	3	*	0
	4	24	0
MBI	5	23	4
	6	37	39
	7	*	46
	8	31	61
	9	24	71
	10	16	56
	11	52	81
	12	80	73
	13	36	75
	14	54	81
Lunch rule + MBI	15	75	87
	16	3	0
	17	43	90
	18	51	90
	19	50	90
	20	79	93
	21	140	94
	22	39	79
	23	65	83
	24	81	89
Lunch rule + MBI	25	88	91
	26	2	0
	27	88	93
	28	56	83
	29	7	0
	30	6	0
	31	9	0
	32	58	85
	33	50	96
	34	105	98
Lunch rule + MBI	35	50	98
	36	63	100
	37	69	98
	38	78	99
	39	91	99
	40	36	97
	41	56	100
	42	80	99
	43	72	100

A “*” denotes data were unavailable

Fig. 1 The figure displays the percentage of independent bites of food across all eight phases: (a) baseline, (b) MBI, (b') lunch rule + MBI, (c) no instructions, and (d) meal self-management. Sessions with 100% independent bites are denoted with an open circle

introduction of the first MBI treatment phase. When a lunch rule was added to the MBI (i.e., B' phase), the average percentage of independent bites increased to 88.8%. Removing all lunch prompts and rules (i.e., C phase) resulted in zero independent bites and emotional responding. When MBI and the lunch rule were reintroduced, the percentage of independent bites returned to high levels ($M = 93\%$). When the self-management intervention was put into place, Hans' percentage of independent bites decreased substantially from the previous phase ($M = 20.8\%$), eventually reaching 0% independent bites. During the last phase of the study, the rule to "Eat your lunch" and a general food-related instruction resulted in high levels of independent eating ($M = 97.4\%$). On a few occasions Hans started eating as soon as he sat down at the table before the therapist provided the lunch rule (i.e., 100% independent bites). At the conclusion of the treatment, Hans no longer required any prompts, confirmations, or instructions to eat lunch at the center. He also ate lunch with a peer on a regular basis and ate at restaurants with his family without any prompting for eating.

A few limitations should be noted. First, the study took place across an eight-month span of time. Given that all sessions occurred at lunch, only one data point could be collected each of the 2 days per week he attended at the center. Several gradual changes were made to the instructions that were provided as a rule to evoke meal consumption. It is possible that we could have progressed through the variations of the instructions more quickly (i.e., from 3 bites, to 7 bites, to 12 bites), but this was not tested. Also, the number of return-to-baseline sessions was limited and did not allow for a pattern in responding to emerge before the next phase began. Additionally, there

were no explicit generalization data from family meals in the community. Maintenance data were also not collected; however, parents reported successful meals. Another limitation was the amount of food Hans ate per bite. This ranged from one piece of food to a spoonful. Although not directly measured, as the study progressed, the amount of food Hans consumed per bite increased. That is, by the end of the study, Hans was no longer consuming single bites of food, but rather unprompted spoonfuls of food.

Despite its limitations, the study's strengths may address gaps in the literature related to feeding problems in children with autism. Although previous studies have incorporated prompting to address a variety of feeding problems (e.g., Anglesea et al., 2008; Dempsey et al., 2011), the current study presents a unique case of prompt dependence and the use of systematic instructions as prompts to address this issue. We used Hans' preference for and adherence to rules as a way to shape flexibility and tolerance for various rules. Generic and less frequent instructions (i.e., the last phase of the study) replaced frequent and specific instructions (i.e., MBI) to increase the likelihood Hans would generalize the skill across settings. Additionally, although not directly addressed, the use of the termination procedure allowed the clinical team to teach Hans the difference between feelings of hunger and satiation, as he was not able upon the start of behavioral services. Future research could further evaluate the use of systematic prompts to address other feeding problems and perhaps document more cases in which individuals have become prompt-dependent during meals.

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Compliance with Ethical Standards No funding was associated with the current study.

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent was obtained from all individual participants included in the study.

References

- Ahearn, W. H. (2003). Using simultaneous presentation to increase vegetable consumption in a mildly selective child with autism. *Journal of Applied Behavior Analysis*, 36, 361–365. doi:10.1901/jaba.2003.36-361.
- Anglesea, M. M., Hoch, H., & Taylor, B. A. (2008). Reducing rapid eating in teenagers with autism: use of a pager prompt. *Journal of Applied Behavior Analysis*, 41, 107–111. doi:10.1901/jaba.2008.41-107.
- Dempsey, J., Piazza, C. C., Groff, R. A., & Kozisek, J. M. (2011). A flipped spoon and chin prompt to increase mouth clean. *Journal of Applied Behavior Analysis*, 44, 961–965. doi:10.1901/jaba.2011.44-961.
- Girolami, K. M., Kahng, S. W., Hilker, K. A., & Girolami, P. A. (2009). Differential reinforcement of high rate behavior to increase the pace of self-feeding. *Behavioral Interventions*, 24, 17–22. doi:10.1002/bin.273.
- Mueller, M. M., Piazza, C. C., Patel, M. R., Kelley, M. E., & Pruett, A. (2004). Increasing variety of foods consumed by blending nonpreferred foods into preferred foods. *Journal of Applied Behavior Analysis*, 37, 159–170. doi:10.1901/jaba.2004.37-159.
- Oppenheimer, M., Saunders, R. R., & Spradlin, J. E. (1993). Investigating the generality of the delayed-prompt effect. *Research in Developmental Disabilities*, 14, 425–444. doi:10.1016/0891-4222(93)90036-J.
- Sharp, W. G., Rashelle, C. B., McCracken, C., Nuhu, N. N., Marvel, E., Saulnier, C. A., & Jaquess, D. L. (2013). Feeding problems and nutrient intake in children with autism spectrum disorders: a meta-analysis and comprehensive review of the literature. *Journal of Autism and Developmental Disorders*, 43, 2159–2173. doi:10.1007/s10803-013-1771-5.
- Volkert, V., & Vaz, (2010). Recent studies on feeding problems in children with autism. *Journal of Applied Behavior Analysis*, 43, 155–159. doi:10.1901/jaba.2010.43-155